Research

Principles to Rationalize Spectrum Policy

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Introduction

The architecture of the Internet has been dramatically redrawn in the last decade. Consumer demand for video and other streaming services has changed the traditionally hierarchical Internet into a flat network. All the while, smart regulation in wireless undertaken by successive administrations has begun to yield fruit. The United States undertook the first spectrum auction in 1994 and has since repeated the successful sales, sparking dynamism in the sector.

A number of policy experts claim that wired fiber to the home is the end technology that broadband policy should be cabined around. However, by many estimates, wireless data usage will ultimately exceed wired usage to become the preferred method of accessing the Internet and other advanced communication services.[1] The United States is a country on the go, and there is no reason to think that our broadband future has to be wired, if we get our policies right.

In part, the Energy and Commerce Committee is aiming to do just that, by releasing the second of four papers in an effort to update the Telecommunications Act for the digital age. This comment is a response to that prompt, and more clearly focuses on four of the questions:

- What should be done to encourage efficient use of spectrum by government users?
- What other steps can be taken to increase the amount of commercially available spectrum?
- Should all Federal Communications Commission (FCC) licenses be flexible use? In what instances should the Commission exercise control over the service offered? How can the Act enable better use of spectrum, either flexible or specified?
- What structural changes, if any, should be made to the FCC to promote efficiency and predictability in spectrum licensing?

Spectrum policy in the United States developed from a hodgepodge of government regimes and giveaways, resulting in an amalgamation of a spectrum map. Policymakers now face a daunting task. In order to repurpose spectrum for the most efficient means, some actors in the system will have to give up their holdings, including broadcasters, civilian agencies, and military entities. Given the regulatory history and the problems we face now, the FCC should create a regime that is able to meet the flexible needs of tomorrow, so that the current holdings can be adapted to future needs. While some dream of a world without spectrum scarcity made so by technology, that world is far off.

With increased pressure from the industry to reform and demands, the FCC should structure spectrum policy on four major principles:

- Aim to maximize the total social and economic value of spectrum;

- Rationalize spectrum policies;
- Be agnostic about auction outcomes; and
- Ensure secondary markets can work efficiently.

Though there are those who would want to change it, these principles have been with the agency from the beginning. Even the FCC recognized that micromanaging spectrum outcomes could be disastrous, and said it should "rely on market forces to ensure economically efficient use of spectrum."[2] The path forward is clearer than most are willing to admit, but what is missing is the political will to ensure it occurs.

A Picture of Industry Competition and the Spectrum Constraint Problem

Mobile telephony has taken off dramatically in the last decade due to a number of key developments. Mobile phone ownership is now nearly ubiquitous, as over 90 percent of Americans own a cell phone. Smartphones are similarly being adopted at a quick pace. From May 2011 to January 2014, ownership of these phones jumped from 35 percent to 58 percent.[3] Part of the success is due to the competition among the four national carriers. For over 92% of the population, there is a choice among 4 or more providers. Moreover, while the overall Consumer Price Index increased by 40 percent between 1997 and 2012, Wireless Telephone Services CPI has declined nearly 40 percent. These various dimensions of competition and the generous benefits carriers have been willing to shell out in order to break contracts have given consumers reasons to switch, as evidenced by the churn rate.[4]

Few areas of the economy have seen the growth numbers that wireless data can claim. Just last year, the United States' consumer mobile data traffic grew 80 percent, nearly 2.5 times faster than fixed IP traffic. Projections by Cisco suggest that this frenzied clip is unlikely to end, with an estimated 8-fold growth from 2013 to 2018. In other words, the entire industry should expect a compound annual growth rate of 50 percent for the next five years.[5]

One of the most important inputs to this dynamic market, spectrum, is running out. The spectrum map has been enclosed, so the FCC cannot readily auction off new spectrum unless current users are moved off their holdings. Reallocating users to different parts of the band poses its own series of highly fraught technical and political issues, in addition to huge costs. Wireless companies are partly routing around the problem of spectrum constraint by building cell sites in selected areas, but in the long run, it will lead to relative overcapitalization and higher costs for everyone.

The need for stable, predictable, and manageable spectrum resources has long been a problem for wireless companies, and they have been willing to bear substantial costs to obtain additional spectrum. Increasingly, however, regulatory uncertainty has added a new dimension. Generally, companies have two options to get new chunks of the airwaves, either through auction or the secondary market. The FCC has set up roadblocks such as restrictions on auctions and on buying for the two largest players, AT&T and Verizon. Ending these practices will go a long way to ensure that consumers receive the kind of service increases they have come to expect.

In one section of the prompt, the Energy and Commerce Committee, asked, "What structural changes, if any, should be made to the FCC to promote efficiency and predictability in spectrum licensing?" In part, the question can be answered by a quip from Ithiel de Sola Pool from the 1980s: "The time has come to bury the old cliché that spectrum is a scarce resource. It is an abundant resource, but a squandered and misused one."[6] The Commission needs to rationalize its approach on a number of fronts.

The Government Spectrum Problem

1926 was a watershed year for spectrum allocation. In the decade previous, amateur radio popped up, and the first commercial radio broadcasts began. In the absence of government regulations, de facto property rights were being established by those who got to the space first, by so called first priority of use. Court cases changed this trajectory, spurring Herbert Hoover, then Secretary of the Commerce Department, to stop supporting priority in use claims. Interference became the norm as new upstarts tried to poach popular radio stations' frequencies. Congress soon passed the Radio Act of 1927, establishing the Federal Radio Agency (FRA) which had stewardship of the spectrum. The successor agency we all know, the FCC, continues in the footsteps of the FRA and determines how various frequencies are used and who could use them through the license system.

The regulatory structure changed little over the years. As TV broadcasting and satellite each came into their own, the FCC allocated generous portions of the spectrum to companies in those industries without much fanfare and with the expectation that they would be renewed. For example, nearly 330 Mhz of spectrum was set aside for UHF television, which is equivalent to about half of all spectrum dedicated to wireless.[7] Yet, the experience was not successful, and large portions of the band have since been vacated for reassignment for mobile use.

The story of "wireless cable's" 198 Mhz allocation features many of the same elements as the UHF story. Both narratives have been retold over and again in the annuals of FCC spectrum history.[8] The combined result of these decisions is a spectrum map that is a hodgepodge of discretely carved out fiefdoms for specific uses. The extreme specificity by the FCC in how licenses could be used and for what purpose at one point ran 1330 pages in the Code of Federal Regulations.[9] Yet, the arguments in favor of special purpose network carve outs have passed their prime. Defining exact uses for spectrum means that repurposing the bands requires a redefinition for the license use. Recognizing these problems, the FCC now issues flexible use licenses. While it is important to define spectrum allocations to conform to international standards, there are few if any reasons why the FCC should stray from this new regulatory direction. As a long term goal, the FCC should work towards the creation of a single network by phasing out existing application specific licenses.

Implementing this long term goal will require the clarification of the rights of spectrum license holders. Poor receiver standards derailed the deployment of LightSquared. Formally, Lightsquared was a satellite communications company, who saw an opportunity to convert their spectrum holdings from satellite transmission to a terrestrial wireless network. After getting approval from the FCC to build their network in 2004, the company was able to secure over $4 billion to create a carrier network.[10] All of this was rolling along smoothly until GPS manufacturers began complaining about interference. Poor receiver standards, that is, poorly made GPS devices, were the cause of the interference, but the FCC could not find a solution and shut down LightSquared's network. The company eventually filed for bankruptcy in 2012, but the episode explains just how disastrous ill-defined rights in spectrum licenses can be.

Generous allocations of spectrum were not just reserved for companies. Governmental agencies also received large swaths of the airwaves. In total, more than 1500 MHz is reserved by the U.S. federal government for agency use. Agencies are not forced to internalize the actual market cost of spectrum. Separated from the larger market, inefficiency abounds. Of course, to their defense, government agencies have gone a long way to reallocate and merge, especially on the 1755 to 1780 band, which will soon come to auction. Moreover, if the case of the iPhone's Siri app is instructive, new applications can drive up demand sharply, so it is only natural for the government especially to be reluctant to release spectrum which it might desperately need for tomorrow's applications.

Nevertheless, the government needs to fully bear the market cost of spectrum, as any other consumer, and should transition to a fully market based system. One option that has been floated is a Government Spectrum Ownership Corporation (GSOC), which would act much like the federal agency that manages federal real estate, the Government Services Administration (GSA). The GSOC would become the owner of all government spectrums and would lease it to government users at market rates. In turn, the GSOC could sell (or rent) surplus spectrum to the private sector, and purchase additional spectrum as needed.[11]

In the meantime, the NTIA should conduct a comprehensive audit of the government's spectrum holdings to create a comprehensive inventory of the country's total spectrum licenses. Additionally, the audit would be undertaken with the ultimate purpose of privatizing federal, state, and local spectrum holdings. Work can begin by giving companies more certainty in the regulatory regime as well as lifting restrictions on spectrum auctions.[12]

Transaction Review and the Spectrum Screen

As wireless companies have become more anxious to add to their spectrum, acquiring smaller carriers has become an approach. But because the FCC has power over spectrum holdings, it similarly has the ability to review the spectrum transactions. One of the tools the FCC has used to determine if a deal should go through or not is the spectrum screen. If a transaction gives the company control over less than a third of the important spectrum in a market, then it is claimed to be competitive, which ends the competitive analysis. If however, the merged entity goes over this limit, then further analysis is conducted. As Geoffrey Manne and Larry Downes have explained,

> "Given the changing dynamics of the mobile marketplace, any spectrum screen would need to be regularly reviewed and clearly articulated, but the FCC continues to make its adjustments more-or-less randomly. There's no actual methodology—or none expressed—as to how adjustment decisions are made. For example, BRS spectrum is included in the spectrum screen in some markets, but not in others, and EBS spectrum is not included in the spectrum screen at all. Because Clearwire's network uses only these two spectrum bands, Sprint's holdings in Clearwire are excluded from the screen."[13]

In the AT&T andT-Mobile deal, the screen was made as an important linchpin in the FCC's argument against the merger. As Downes first reported, the staff made a significant adjustment to the screen during the deal, producing failure in 274 of roughly 700 markets. Without the adjustment, the transaction would have failed in only 192 markets. The ordeal pushed the FCC toward releasing an NPRM on the issue. Because of the power that the spectrum screen has over transaction review, the four large carriers have been fervently discussing the issue. But the antitrust theories underlying the spectrum screen have long been replaced. So, the FCC should reject the spectrum screen, which is based in outdated HHI and instead move towards a rule of reason approach for transaction review.[14]

Spectrum Auctions

As part of the Middle Class Tax Relief Act, Congress gave authority to the FCC to conduct the incentive auction, the first of its kind that conducts two simultaneous spectrum sales. While the original goal for the auction was 120 Mhz of "beachfront" spectrum, estimates have had a downward trajectory as of late, and now are in the range of 60-80 MHz. Importantly, the agency has been toying with limiting the entry by the two largest companies, Verizon and AT&T. In a paper authored by Coleman Bazelon and Douglas Holtz-Eakin, President of the American Action Forum, imposing spectrum limits were found to reduce auction revenues by up to 40 percent, lower auction proceeds from $31 billion to $19 billion, and impair the first responder network

it is intended to fund.[15] The findings were replicated across a number of studies and the results have all been similar.[16]

Auctions designed to achieve stated policy goals through restrictive or preferential auction participation rules have largely been unsuccessful. Limits on participation have resulted in distorted prices, misallocation spectrum, and severe competitive issues in the post-auction market. Discriminatory participation rules, including the US experience with the C and F Blocks of the PCS band, have delayed the deployment of spectrum by an average of seven years, which has adversely harmed competition.[17] In this late stage of the game, it is not clear that the FCC should be messing with a recipe that has worked in the past. Free entry has allowed small and regional players to come to the market, and it has been instrumental in getting spectrum to where it is really needed–consumers.

FCC Chairman Tom Wheeler justified the limits on the grounds of public interest, claiming that the current marketplace lacks competition and is merely the result of historical contingency. However, Sprint's investment missteps with WiMax and T-Mobile's lack of bidding in the last round of auctions adds depth to this historical contingency. As noted previously, the industry is actually described as having falling prices, accelerating output, technological dynamism, surging investment, and multidimensional competition. All of this is a far cry from a non-competitive landscape.

As FCC Commissioner Robert McDowell warned US lawmakers:

> "I am hopeful that the Commission will not put America's positive momentum in the wireless area at risk as we explore the myriad options related to the incentive auctions. History teaches us that past regulatory efforts to micromanage the wireless market, despite presumed good intentions, have resulted in harmful unintended consequences."[18]

Conclusion

The path forward is clearer than most are willing to admit, but what is missing is the political will to ensure it occurs. Consumers are demanding wireless services. To ensure that this innovative sector continues to develop, the FCC needs to rationalize spectrum policies and be agnostic about auction outcomes, so that spectrum is efficiently reallocated through the primary and secondary markets.

[1] VNI Mobile Forecast Highlights, 2013 – 2018, Cisco, http://www.cisco.com/c/dam/assets/sol/sp/vni/forecast_highlights_mobile/index.html